

# Technology Opportunity

## Dynamic Gas Temperature Measurement System

The National Aeronautics and Space Administration (NASA) seeks to transfer a gas-temperature measurement technique that can detect temperature fluctuations to 1000 Hz in a hot, high-velocity gas stream.

### Potential Commercial Uses

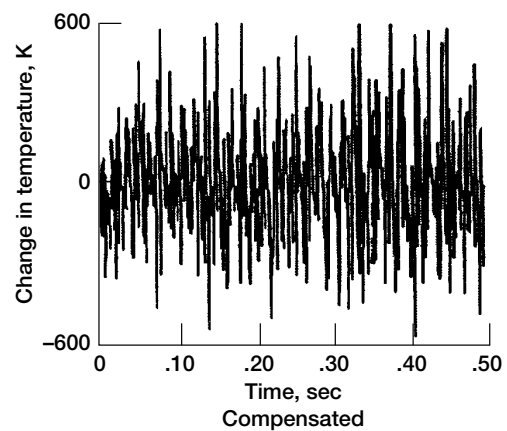
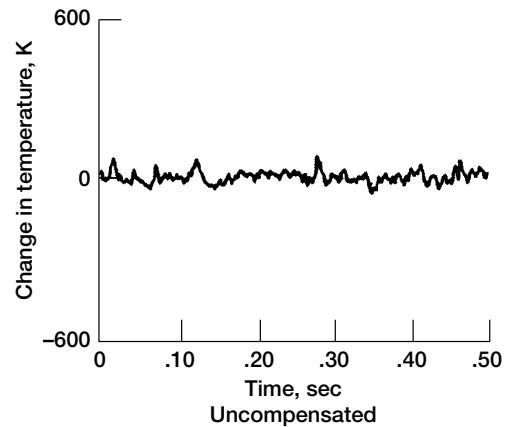
- Measure the temperature fluctuations at the combustor exit of commercial and automotive gas turbines
- Measure the rapidly fluctuating gas temperatures at the exhaust port of internal combustion engines

### Benefits

- Temperature fluctuations in the combustor exhaust provide a measure of fuel mixing in the combustor.
- Wide variations in gas temperature contribute to the thermal stress of first-stage stators.
- High-temperature filaments in the gas stream are correlated with NO<sub>x</sub> formation. These fluctuations are not detected if only the mean gas temperature is measured.
- Optical access is not required.
- Data collection and reduction require only a personal computer.

### The Technology

The dynamic gas temperature measurement system consists of a dual-thermocouple probe, anti-aliasing filters, differential amplifiers, a personal computer with a data-collection board, and data reduction software. By comparing the frequency response of the two thermocouples on the probe (which have different diameters), the software is able to compensate by adjusting the frequency of the signal from the smaller thermocouple to 1000 Hz. The figures show the uncompensated and compensated signals from the exhaust of an atmospheric burner.



Compensated and uncompensated signals from an atmospheric burner.

The technology has been significantly advanced: data reduction, which formerly required a main-frame computer and 3 to 5 days of processing time, now requires only a 486 or better personal computer and less than a minute of processing time.



## Options for Commercialization

No applicable patent; none applied for. Lewis is seeking partnerships with industry for nonaerospace applications.

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## Key Words

Thermocouples  
Gas temperature



National Aeronautics and  
Space Administration  
Lewis Research Center